

thiamin, in terms of food metabolized, would be the same in rats as in humans. It would not be expected that optimal requirements for the two species would be the same per unit of body weight and no such calculation will be here attempted. For the last three years it has been widely stated that the optimal thiamin requirement for humans is about 0.5 to 0.6 mgm. per 1,000 calories. In a recent report Keyes *et al.* concluded that 0.23 mgm. of thiamin per 1,000 calories was optimal. This estimate and the one secured for rats in the present experiment are in much closer agreement than either is with the currently accepted recommendation for thiamin requirement.

One possible criticism of this experiment is that the results are true only for the particular lots of bread tested and that bread may vary widely in composition. This is, of course, valid. The bread in question was that which was actually available to consumers from one large bakery. It would be an advantage to conduct similar experiments on a number of samples. The cost of such experiments and the time involved limit the number which can be done by most laboratories.

#### SUMMARY

In a feeding experiment in rats in which rations were designed to approximate human dietaries in Canada in the ratio of protein, carbohydrate and fat, in which bread was supplied in the proportion of six slices per 2,500 calories, and in which rations bread was the only source of B vitamins, it was found that Canada Approved white bread was more valuable than ordinary white bread but that whole wheat bread was markedly superior to either of the other two types. Separate administration of thiamin, riboflavin, pyridoxin and pantothenic acid showed that whole wheat bread, in the proportions used, supplied optimal amounts of thiamin, pyridoxin and pantothenic acid and practically an optimal amount of riboflavin; Canada Approved white bread furnished nearly an optimal amount of thiamin, pyridoxin and pantothenic acid but insufficient riboflavin; ordinary white bread was deficient in all four vitamins.

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#### RÉSUMÉ

Des expériences pratiquées sur des rats soumis à l'ingestion de pain dans des conditions rappelant à peu près les conditions humaines ont démontré que le pain blanc approuvé par le Canada avait plus de valeur nutritive que le pain blanc ordinaire, mais aussi que le pain complet était supérieur aux deux autres. Le pain complet contient les quantités suffisantes de thiamine, de pyridoxine, d'acide pantothénique et de riboflavine; le pain blanc approuvé par le Canada est insuffisant en riboflavine; le pain blanc ordinaire manque dans des proportions diverses des quatre vitamines mentionnées.

JEAN SAUCIER

## ACUTE MEMBRANOUS STOMATITIS AND CONJUNCTIVITIS

### (A Report of Three Cases)

By Captain J. A. Langille, C.A.M.C.

THE term "maculofibrinous stomatitis" was first used by Fraenkel<sup>1</sup> in 1888 to describe membranous and pseudomembranous infections of the mouth. Since then a number of cases have been described in which other mucous membranes have also been involved. Among these are cases reported by Neuman,<sup>2</sup> Christlieb,<sup>3</sup> Moro,<sup>4</sup> Laszlo,<sup>5</sup> and Flusser.<sup>6</sup>

More recently, Walton *et al.*<sup>7</sup> reported three cases similar to the above, which occurred in the Canadian Army in England, in 1940. Each had a purulent conjunctivitis and a severe membranous stomatitis, and was acutely ill. All failed to respond to the sulfonamides, and a Gram-positive diplococcus was isolated from the eyes and mouth of each. These were not agglutinated by any of the pneumococcal typing sera, and it was thought they probably belonged to the streptococcal group, type faecalis.

These cases were treated with transfusions of stored whole blood with spectacular results.

It was suggested that these cases may have been due to a vitamin B<sub>2</sub> deficiency, especially in view of the remarkable results obtained following transfusions. They also referred to an article by King<sup>8</sup> which drew attention to the possibility of a deficiency of the pellagra-preventing factor (nicotinic acid) in cases of "trench mouth" and Vincent's disease.

Henry<sup>9</sup> reported three cases which occurred in the R.A.F. in 1942. The patients were acutely ill with purulent conjunctivitis and membranous stomatitis. Skin lesions were also present. Swabs from the mouth failed to reveal Vincent's organisms in sufficient quantity, but streptococci were grown on culture. All cases failed to respond to sulfonamides, but responded promptly to small transfusions of whole blood.

Three cases similar to the above were admitted to the Halifax Military Hospital during the past summer. Two of these belonged to the Canadian Army, the third to the R.A.F.

### CASE REPORTS

#### CASE 1

A soldier, aged 23, was admitted on May 24, complaining of a sore throat, sore mouth and sore eyes. The mouth and throat had become painful about ten days before admission. He was admitted to the unit sick bay and treated with gargles and sulfanilamide without improvement. The mouth condition became worse, and three days before admission to hospital his eyes became acutely inflamed.

He gave a history of having been employed in the woods throughout the greater part of the winter, and had joined the army about a month before admission. For the previous four months his diet had consisted almost entirely of meat, well cooked vegetables, white bread and pastry, without any fresh fruit or raw vegetables.

He was apathetic and mentally dull. A severe purulent conjunctivitis with marked photophobia was present. The lips were covered with reddish black scaly crusts, and a profuse mucopurulent discharge escaped from one corner of the mouth.

The mucous membrane of the cheeks, tongue, floor of the mouth, uvula, hard and soft palate, posterior pharyngeal wall and gingival margins was covered with large coalescing patches of thick greyish white membrane. These were easily removed and left freely bleeding surfaces. More than one-half of the buccal mucous membrane was involved on admission. There were twelve carious teeth.

Scattered over the arms, legs and trunk were a number of reddish brown patches about one cm. in diameter. These were quite flat and scaly, did not bleed readily, and resembled somewhat the rash of secondary syphilis.

Extending from the margin of the urethral meatus over the preputium of the penis was a similar area about two cm. by one cm. This was covered with small reddish brown crusts which were readily removable and left a freely bleeding surface. The Kahn test was repeatedly negative.

The preauricular, submental and inguinal glands were enlarged. There were no abnormal neurological findings except those mentioned above. Balance of the physical examination was negative.

During the first two weeks in hospital there was little change in the patient's condition. The highest daily temperature varied from 101 to 103°. The stomatitis became more extensive, until the whole surface of the tongue and two-thirds of the buccal mucous membrane were involved. Various mouth washes, including perborate, potassium permanganate, a solution of sodium sulfathiazole, and lime water were tried without success. The conjunctivitis failed to improve under boric compresses and a solution of zinc sulphate. Thirty grm. sulfathiazole were given in five days without evident improvement. The leucocytes after four days of this was 8,100 with 60% polymorphonuclears and 40%

lymphocytes. One week later the leucocytes were 13,600.

A number of smears were taken from the mouth. In only one of these were Vincent's organisms found. The others showed a mixed flora, with a Gram-positive diplococcus common to all specimens. On culture this was found to be a non-hæmolytic streptococcus. Several smears from the eyes were also examined and found to contain Gram-positive diplococci.

As might be expected, with the extension of the stomatitis and pharyngitis, it became daily more difficult to supply the patient with sufficient nourishment. For this reason it was suggested that fresh fruits, liver and cod liver oil should be added. On the fourteenth day in hospital, four oranges and a half pound of liver daily, and cod liver oil, 3 ii t.i.d., were ordered.

Improvement in the stomatitis and pharyngitis was rapid. Within a week the discharge had ceased, and the sloughing membranes had been replaced by healthy granulating surfaces. Within two weeks these had almost completely healed, and necessary dental extractions could be carried out.

The conjunctivitis was a bit slower in clearing, and cod liver oil, min. v in each t.i.d., was added to the treatment mentioned above. This appeared to hasten resolution. Two chalazions appeared on each upper lid during the illness. These were opened after the surrounding inflammation had resolved. Smears taken from these revealed numerous Gram-positive diplococci.

With the improvement noted above, the skin lesions soon disappeared and there was a marked rapid improvement in the patient's mental symptoms. He was discharged after five weeks in hospital, completely recovered, although he was still five pounds below his enlistment weight. A recheck one month later revealed a further gain of five pounds in weight, and no recurrence of any infection.

#### CASE 2

The second case was transferred from a military hospital for venereal disease, with a diagnosis of gonorrhoeal conjunctivitis following an acute urethritis, on June 18.

A member of the R.A.F. 20 years of age, he had first noticed a urethral discharge on May 15 while spending two weeks in the United States. He stated that he was terrified about this and was unable to eat as a result. Four days later he applied to an American Army hospital where he was admitted and given sulfathiazole. This caused rather severe vomiting. One week later, with a supply of sulfathiazole, he returned to his station. He was treated in the unit hospital for the next two weeks and received thirty grm. sulfathiazole. This also caused considerable vomiting. He was transferred to the V.D. Hospital on June 4, and there received an additional 35 grm. sulfathiazole. Again vomiting was quite severe, and after a few days he developed a severe infection of the eyes, and complained of frequent nose-bleeds and loss of sense of smell.

On physical examination there was a severe bilateral purulent conjunctivitis, and a mucopurulent nasal discharge. The mucous membrane over the middle turbinates and septum was covered with large patches of greyish-white membrane. These were easily removed and left freely bleeding surfaces. A similar patch about two cm. by three cm. covered the upper part of the right anterior tonsillar pillar, and extended on to the soft palate. The preauricular and submental glands were enlarged. Mental dullness and apathy were quite marked. There were no skin lesions, and no urethral discharge was present on first examination. The Kahn test was negative. His blood picture four days after admission was: Hgb. 55%; red cells 4,250,000; white cells 21,550, polymorphonuclears 75% and lymphocytes 25%. Several smears from the eyes and mouth were negative for Gram-negative diplococci, but showed numerous Gram-positive cocci occurring in pairs and short chains. On culture these were non-hæmolytic.

This patient was placed on sulfathiazole on admission, (24 grm. in the first four days), and energetic local treatment of his conjunctivitis instituted. Vomiting was quite troublesome, with marked anorexia. He developed an iritis with punctate keratitis. Cycloplegic drops and continuous boric acid compresses were ordered for this. The ulcerations in the nose and mouth became worse, and a urethral discharge reappeared. His highest daily temperature varied from 101 to 102.8°.

In consultation with the ophthalmologist, on whose service this patient was admitted, and the officer in charge of medicine, it was decided, as soon as the report on the first smears was obtained, to discontinue sulfathiazole, and to give him a full diet with the addition of cod liver oil, 3 ii t.i.d., and four oranges, and one-half pound of liver daily. The urethritis was treated locally.

This patient was also seen by the consultant ophthalmologists attached to the local R.C.N. hospital and was taken to this hospital for a slit lamp examination. This confirmed the diagnosis of iritis and keratitis. Some evidence of corneal vascularization suggesting a vitamin deficiency was also reported.

Two weeks on the above treatment was enough to clear up the eye, nose and mouth infections. The sense of smell gradually returned, the temperature settled to normal, the hgb. increased to 72% and the leucocytes became normal. Weight gain was six pounds.

After three weeks' treatment, vision had returned to normal, and the patient was able to get about and spend a considerable part of each day in the sunlight. The urethritis, however, did not clear up completely and the patient developed an acute arthritis of the right ankle. He was returned to the V.D. hospital for further treatment on August 4.

### CASE 3

The third case, an N.C.O. in the artillery, aged 25, was admitted on June 27, complaining of sore eyes and sore mouth of four days' duration. He had been in the army about eight months and had spent two weeks in this hospital in February with acute streptococcal tonsillitis. He stated that in the intervening months his throat had always been a bit sore and that swallowing had been painful. Because of this he had been unable to eat certain foods. His diet during this time had contained no raw vegetables and very little fresh fruit. He had lost about five pounds during his illness in February, and an additional five pounds in the past two months.

He was admitted to another medical ward and treated with sulfathiazole (8 grm. on the first day, followed by 5 grm. daily), for three or four days without any evidence of improvement, before being transferred to the ward in which the above cases were being treated.

Examination revealed a well developed young man, obviously quite ill. Apathy and mental dullness, though apparent, were not so marked as in Case 1. There was a severe bilateral purulent conjunctivitis, with moderate photophobia. The lips were covered with reddish black scaly crusts, and several coalescing areas of greyish white membrane were present on the mucous membrane of the tongue, cheeks and pharynx. The preauricular and submental glands were enlarged. There was no rash on the skin. No sensory or motor changes of the extremities could be elicited.

Highest daily temperature varied from 100 to 102°. The Kahn test was negative. Blood picture shortly after admission showed Hgb. 88%, white blood cells 18,450, polymorphonuclears 75% and lymphocytes 25%. Smears from the mouth and eyes were negative for Vincent's organisms and fungi. They showed a mixed flora, with non-haemolytic streptococci in pairs and short chains reported in two specimens from the mouth, and one from the eyes. One specimen from the mouth also contained a haemolytic streptococcus on culture.

This patient was placed on a full diet, with oranges, liver and cod liver oil. Lime water mouth washes, and cod liver oil and a solution of zinc sulphate for the eyes were also ordered.

Response to treatment was very satisfactory. The temperature remained normal after the tenth day. The conjunctivitis had cleared up completely in two weeks, and at the end of three weeks the mouth lesions had healed.

This patient had one carious tooth removed while in hospital. He was discharged, completely recovered, four weeks after admission.

### DISCUSSION

Three cases presented above have several interesting features in common:

1. They each had severe infections of the eyes and mouth.
2. Malnutrition, and a low intake of the principal vitamins, especially of vitamin B complex and vitamin C, were present in each.
3. Gram-positive diplococci, considered by the pathologist to be streptococci, were isolated from the lesions.
4. The infections were resistant to local treatment and the sulfonamides, but cleared up readily on a high vitamin diet.

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STILL A PROBLEM.—Tuberculosis has been present for so long and people are so accustomed to it, that the interest of the public and of many public health workers is in danger of being sidetracked to more glamorous and exciting problems. This is a serious deterrent to accomplishment in this field. Further, the decline in tuberculosis, both in morbidity and mortality, in the last 40 years, may lead some to think that the problem is one of the past. Let there be no mistake in this direction. Tuberculosis continues to be a real problem. If, instead of comparing the tuberculosis rate of today with what it was 50 years ago, one will compare the tuberculosis prevalence and mortality of today with today's prevalence and mortality of other diseases, the present seriousness of the tuberculosis problem can be appreciated. In the most productive period of life, tuberculosis continues to cause more deaths than any other one disease.—Ed., *Am. J. Public Health*, 1943.